LOS HONGOS DE COLOMBIA - IV. *BISPORELLA TRISEPTATA* AND ITS ALLIES IN COLOMBIA

By

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During the combined mycological explorations of Colombia by the Instituto de Ciencias Naturales (Bogotá), Instituto Colombiano Agropecuario (Bogotá) and The New York Botanical Garden, many new and interesting fungi have been discovered. Among these, several collections of an apparently rare and poorly known species of *Bisporella* Sacc. were made, which are worthy of report.

Bisporella, a genus of inoperculate Discomycetes, is common in the temperate zone and was thought to be uncommon or rare in the Neotropics until the publication of Carpenter (1975), which reported the Neotropical distribution (including Colombia) of *Bisporella discedens* (Karst.) Carpenter. The genus is easily recognized in nature by its small, bright yellow, sessile apothecia, which generally occur on woody substrata. In longitudinal section, the internal anatomy of the apothecium is characterized by a gelatinized or subgelatinized ectal excipulum, with little or no differentiation of a medullary excipulum. This genus was previously referred to as *Calycella* (Fr.) Boud., but as Korf and Carpenter (1974) have discussed, the name *Bisporella* must be used for these fungi. Dennis (1960) first described *Calycella sulfurina* (Quél.) Boud. var. *triseptata* Dennis from Venezuela, but gave almost no description of microanatomical features. We thus present an expanded description and transfer of the taxon to the genus *Bisporella* Sacc. and raise its status to that of a species.

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A PARTIAL TREATMENT OF NEOTROPICAL SPECIES OF BISPORELLA

Since *Bisporella* is a common and easily collected Discomycete in the Neotropics, we feel it appropriate to here present a key and diagnoses to the species of *Bisporella* which have been reported from Colombia and adjacent countries. It is our hope that identifications of further collections by resident mycologists will be facilitated by this treatment.

KEY TO SPECIES OF *BISPORELLA*

1. Ascospores 3-septate, 14-15 x 2.5-3 μm, asci J — . . . . . B. TRISEPTATA
1. Ascospores 0-1 septate, asci J + or J —
   2. Ascospores 1-septate, 8-10 x 1.5-2.0 μm, asci J — . . . B. DISCEDENS
   2. Ascospores 0-1 septate, 9-14 x 3-5 μm, asci J + ... B. CITRINA

1. **Bisporella citrina** (Batsch ex Fr.) Korf & Carpenter, Mycotaxon 1 (1): 58. 1974.
   ≡ *Calycella citrina* (Batsch ex Fr.) Boud., Bull. Soc. Mycol. France 1: 112. 1885.
   = *Peziza citrina* Hedw. ex Purton, App. Midl. Fl. 3: 457. 1821.
   ≡ *Calycina citrina* (Hedw. ex Purton) Gray, Nat. Arr. Brit. Pl. 1: 670. 1821.
   ≡ *Helotium citrinum* (Hedw. ex Purton) Fr., Summa veg. Scand., sect. post. p. 335. 1849.

This species is characterized by large apothecia, up to 3 mm diam which are deeply cupulate, occurring in groups and with the margins of the apothecia often coalescing. The ascospores are characteristically biguttulate, with the guttules taking up most of the spore volume, and occasionally 1-septate, 9-14 x 3-5 μm. The asci are 75-135 x 8-10 μm according to Dennis (1956) and J + in Melzer's reagent.

Dennis (1954) reported this species from Cuba, noting that the ascospores are slightly narrower than those found in northern temperate collections. Duss (1903) has also described *B. citrina* from Guadeloupe. We have not found this species in Colombia or adjacent countries, and bring it to the reader's attention here so that collectors will be able to identify it if found in the Neotropics again.

2. **Bisporella discedens** (Karst.) Carpenter, Mycotaxon 2 (1): 124. 1975.
   ≡ *Helotium discedens* Karst., Hedwigia 28: 191. 1889.
   ≡ *Calycella discedens* (Karst.) Dennis, Kew Bull. 1954: 320. 1954.

= *Belonidium andinum* Pat., Bull. Soc. Mycol. France 11: 217. 1895.
= *Niptera subiculata* Seaver, Mycología 16: 8. 1924.
= *Trichopeziza aurea* Rick, Broteria, Ser. Bot. 25: 103. 1931.

The apothecia of this species are sessile to subsessile, disc-shaped, plane to slightly concave, translucent-white to bright lemon yellow, 0.5-2.0 μm in diameter. The ascospores are 8-10 x 1.5-2.0 μm, and 1-septate. The asci are 67-75 x 5-6 μm in dimension and J — in Melzer's reagent.

Upon examination of the type specimen of *Belonidium andinum* Pat., we have found that this species agrees in all respects with *Bisporella discedens* and here place it into synonymy with *B. discedens*. The 3-septate ascospores of *Belonidium andinum* described by Patouillard were misinterpreted by him; instead of three septa, there is in fact one septum separating the ascospore into two cells, each of those cells often containing guttules. It is probable that Patouillard misinterpreted the guttules for septa.

We have seen collections in which both white and yellow apothecia are present together, and collections in which either only the yellow form or white form alone is present. The white form is much less common than the yellow form and indistinguishable microscopically from the latter.

COLLECTIONS EXAMINED: Cundinamarca, El Bosque de Titabita, E. Jardines de Paz, indet. twig, 28 Jun 1974, *K. P. Dumont, J. H. Haines, J. M. Idrobo & L. F. Velásquez, CO-13;* Cundinamarca, El Bosque de Titabita, E. Jardines de Paz, stem of *Rubus* sp., 28 Jun 1974, *K. P. Dumont, J. H. Haines, J. M. Idrobo & L. F. Velásquez, CO-39;* Cundinamarca, El Bosque de Las Mercedes, Bojacá, indet. wood, 29 Jun 1974, *K. P. Dumont, J. H. Haines, J. M. Idrobo & L. F. Velásquez, CO-231;* Cundinamarca, Páramo de Choachí, road between Bogotá and Choachí, indet. large petiole, 2 Jul 1974, *K. P. Dumont, J. H. Haines & J. M. Idrobo, CO-452;* Cundinamarca, Páramo de Choachí, road between Bogotá and Choachí, indet. twig, 2 Jul 1974, *K. P. Dumont, J. H. Haines & J. M. Idrobo, CO-456;* Valle, vicinity km 20 from Cali, road between Cali and Buenaventura, indet. wood, 13 Jul 1974, *K. P. Dumont, J. M. Idrobo & L. F. Velásquez, CO-1113;* Cauca, Finca A. Castro, ca. 5 km W. Popayán, road between Popayán and El Tambo, indet. wood, 14 Jul 1974, *K. P. Dumont, J. H. Haines, J. M. Idrobo & L. F. Velásquez, CO-1238;* Cauca, Finca "El Bosque", vereda Guazabarita, El Tambo, indet. twig, 15 Jul 1974, *K. P. Dumont, J. H. Haines, J. M. Idrobo & L. F. Velásquez, CO-1387;* Antioquia, Estación Forestal Experimental Piedras Blancas, Medellín, indet. twig, 19 Jul 1974, *K. P. Dumont, J. H. Haines & L. F. Velásquez, CO-1590;* Antioquia, Estación Forestal Experimental Piedras Blancas, Medellín, indet. wood, 19 Jul 1974, *K. P. Dumont, J. H. Haines & L. F. Velásquez, CO-1597;* Antioquia, Boquerón, Medellín, indet.

twig, 20 Jul 1974, *K. P. Dumont, J. H. Haines & L. F. Velásquez, CO-1667;* Cundinamarca, Hacienda El Soche, Granada, road between Bogotá and Silvania, indet. twig, 23 Jul 1974, *K. P. Dumont, J. H. Haines, J. M. Idrobo,* et al., *CO-1831;* Boyacá, Quebrada Colorada, E. of Villa de Leiva, indet. twig, 26 Jul 1974, *K. P. Dumont, J. H. Haines & J. M. Idrobo, CO-1949;* Cundinamarca, Robledal, between km posts 16-17 from Mosquera, on the Mosquera-La Mesa road, elev. 8.600 ft., indet. wood, 21 Dec 1975, *K. P. Dumont & J. M. Idrobo, CO-2041;* Cundinamarca, ca. 16 km from Mosquera, on the Mosquera-La Mesa road, elev. 8.200 ft., indet. branch, 3 Jan 1976, *K. P. Dumont, J. L. Luteyn & M. L. Luteyn, CO-2123;* Cundinamarca, ca. 16 km from Mosquera, on the Mosquera-La Mesa road, elev. ca. 8.200 ft., indet. wood, 3 Jan 1976, *K. P. Dumont, J. L. Luteyn & M. L. Luteyn, CO-2132;* Cundinamarca, ca. 16 km from Mosquera-La Mesa road, elev. ca. 8.200 ft., indet. wood, 3 Jan 1976, *K. P. Dumont, J. L. Luteyn & M. L. Luteyn, CO-2133;* Cundinamarca, ca. 16 km from Mosquera, on the Mosquera-La Mesa road, elev. ca. 8.200 ft., indet. wood, 3 Jan 1976, *K. P. Dumont, J. L. Luteyn & M. L. Luteyn, CO-2134;* Cundinamarca, ca. 16 km from Mosquera, on the Mosquera-La Mesa road, elev. ca. 8.200 ft., indet. leaf petiole, 3 Jan 1976, *K. P. Dumont, J. L. Luteyn & M. L. Luteyn, CO-2137;* Cundinamarca, ca. 16 km from Choachí, on the Bogotá-Choachí road, elev. ca. 10.200 ft., indet. twig, 4 Jan 1976, *K. P. Dumont, J. L. Luteyn & M. L. Luteyn, CO-2193;* Cundinamarca, 26 km from El Colegio, on the Bogotá-El Colegio road, vía Salto de Tequendama, indet. branch, 28 Feb 1976, *K. P. Dumont, CO-3987;* Cundinamarca, 16 km from El Colegio, on the Bogotá-El Colegio road, vía Salto de Tequendama, indet. branch, 28 Feb 1976, *K. P. Dumont, CO-4010;* Cundinamarca, vicinity km post 22 from Mosquera, on the Mosquera-La Mesa road, elev. ca. 8.400 ft., indet. twig, 5 Jun 1976, *K. P. Dumont, S.E. Carpenter & M. A. Sherwood, CO-4035;* Cundinamarca, vicinity km post 22 from Mosquera, on the Mosquera-La Mesa road, elev. ca. 8.400 ft., 5 Jun 1976, *K. P. Dumont, S.E. Carpenter & M. A. Sherwood, CO-4037;* Cundinamarca, vicinity km post 22 from Mosquera, on the Mosquera-La Mesa road, elev. ca. 8.400 ft., indet. branch, 5 Jun 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-4098;* Cundinamarca, vicinity km post 22 from Mosquera, on the Mosquera-La Mesa road, elev. ca. 8.400 ft., indet. herbaceous stem, 5 Jun 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-4099;* Cundinamarca, vicinity km post 22 from Mosquera, on the Mosquera-La Mesa road, elev. ca. 8.400 ft., indet. vine, 5 Jun 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-4102;* Cundinamarca, vicinity km post 22 from Mosquera, on the Mosquera-La Mesa road, elev. ca. 8.400 ft., indet. vine, 5 Jun 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-4142;* Cundinamarca, vicinity km post 22

from Mosquera, on the Mosquera-La Mesa road, elev. ca. 8.400 ft., indet. herbaceous stem, 5 Jun 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-4145;* Cundinamarca, vicinity km post 22 from Mosquera, on the Mosquera-La Mesa road, elev. ca. 8.400 ft., indet. twig, 5 Jun 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-4157;* Cundinamarca, between km posts 16-17 from Mosquera, on the Mosquera-La Mesa road, elev. ca. 8.300 ft., indet. branch, 5 Jun 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-4222;* Cundinamarca, vicinity km post 36 from Zipaquirá, on Zipaquirá-Pacho road, elev. ca. 8.800 ft., indet. branch, 9 Jun 1976, *K. P. Dumont, S. E. Carpenter, M. A. Sherwood & L. A. Molina, CO-4399;* Cundinamarca, between posts 35-36 from Zipaquirá, on Zipaquirá-Pacho road, elev. ca. 9.300 ft., indet. branch, 9 Jun 1976, *K. P. Dumont, S. E. Carpenter, M. A. Sherwood & L. A. Molina, CO-4447;* Boyacá, along Sogamoso-Aguazul road, at a point 38 km from the intersection with Sogamoso-Aquitania road, elev. ca. 9.000 ft., indet. twig, 13 Jun 1976, *K. P. Dumont, S. E. Carpenter, M. A. Sherwood & L. A. Molina, CO-5116;* Boyacá, along Sogamoso-Aguazul road, at a point 38 km from the intersection with Sogamoso-Aquitania road, elev. ca. 9.000 ft., on Pyrenomycete on log, 13 Jun 1976, *K. P. Dumont, S. E. Carpenter, M. A. Sherwood & L. A. Molina, CO-5168;* Cundinamarca, 18 km from Mosquera, on Mosquera-La Mesa road, elev. ca. 2.600 m, indet. branch, 31 Jul 1976, *K. P. Dumont, S. E. Carpenter, M. S. Sherwood & A. Gentry, CO-5425;* Cundinamarca, ca. 22 km from Bogotá, on the Bogotá-Choachí road, elev. ca. 9.200 ft., indet. substrate, 4 Aug 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-5545;* Cundinamarca, ca. 22 km from Bogotá, on the Bogotá-Choachí road, elev. ca. 9.200 ft., indet. branch, 4 Aug 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-5548;* Cundinamarca, ca. 22 km from Bogotá, on Bogotá-Choachí road, elev. ca. 9.200 ft., indet. twigs, 4 Aug 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-5550;* Antioquia, ca. 102 km from Medellín, on Medellín-Pto. Valdivia road, elev. ca. 8.200 ft., indet. twig, 12 Aug 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-6141;* Antioquia, ca. 102 km from Medellín, Pto. Valdivia road, elev. ca. 8.200 ft., indet. twig, 12 Aug 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-6234;* Antioquia, ca. 25 km from Medellín, on the Medellín-Turbo road, elev. ca. 7.400 ft., indet. branch, 14 Aug 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-6434;* Antioquia, ca. 25 km from Medellín, on the Medellín-Turbo road, elev. ca. 7.400 ft., indet. branch, 14 Aug 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-6436;* Santander, ca. 110 km from Tunja, on the Pto. Berrío-Barbosa-Tunja road, elev. ca. 7.500 ft., indet. wood, 19 Aug 1976, *K. P. Dumont, M. A. Sherwood & L. F. Velásquez, CO-6736;* Norte de Santander, on the Pamplona-Pto. Cobaría

road, at a point 12 km from the intersection with the Pamplona-Chitagá road, elev. 5.800 ft., indet. branch, 20 Aug 1976, *K. P. Dumont, M. A. Sherwood & L. F. Velásquez, CO-6863;* Norte de Santander, on the Pamplona-Chitagá road, elev. 6.000 ft., indet. twig, 20 Aug 1976, *K. P. Dumont, M. A. Sherwood & L. F. Velásquez, CO-6881;* Norte de Santander, ca. 114 km from Bucaramanga, on the Bucaramanga-Pamplona road, elev. ca. 10.000 ft., indet. branch, 21 Aug 1976, *K. P. Dumont, M. A. Sherwood & L. F. Velásquez, CO-6933;* Norte de Santander, ca. 104 km from Bucaramanga, on the Bucaramanga-Pamplona road, elev. ca. 10.000 ft., indet. branch, 21 Aug 1976, *K. P. Dumont, M. A. Sherwood & L. F. Velásquez, CO-7019;* Santander, ca. 37 km from Bucaramanga, on the Bucaramanga-Pamplona road, elev. ca. 9.900 ft., indet. wood, 21 Aug 1976, *K. P. Dumont, M. A. Sherwood & L. F. Velásquez, CO-7111;* Santander, ca. 34 km from Bucaramanga, on the Bucaramanga-Pamplona road, elev. ca. 9.300 ft., indet. branch, 21 Aug 1976, *K. P. Dumont, M. A. Sherwood & L. F. Velásquez, CO-7127;* Santander, ca. 34 km from Bucaramanga, on the Bucaramanga-Pamplona road, elev. ca. 9.300 ft., indet. bamboo culm, 21 Aug 1976, *K. P. Dumont, M. A. Sherwood & L. F. Velásquez, CO-7144.*

3. **Bisporella triseptata** (Dennis) Carpenter & Dumont, comb. nov. Figs. 1,2.
   ≡ *Calycella sulfurina* (Quél.) Boud. var. *triseptata* Dennis, Kew Bull. 14: 431. 1960.

APOTHECIAL MORPHOLOGY: Apothecia 1-1.5 mm in diam, sessile, when fresh plane to slightly concave, drying concave, gregarious, in some collections arising in association with *Arthrinium* Kunze ex Fr. and in the type collection with *Pteroconium* Sacc. ex Grove, on Monocotyledoneous debris. Hymenium and receptacle concolorous, in dried specimens bright sulphur yellow to off-white, rehydrating light yellow to translucent, fresh colors usually some shade of bright yellow to white.

APOTHECIAL ANATOMY: Asci 8-spored, (74-) 75-90 (-100) x 5-6 μm, produced from small croziers, cylindrical, gradually tapering at the base and curving slightly to a small, truncate base, rarely forming a small fork at the base, thin-walled, dextrinoid in Melzer's reagent; pore J — in Melzer's reagent. Ascospores (12-) 14-15 (-20) x 2.5-3.0 (-4.0) μm, irregularly biseriate, hyaline, smooth, triseptate, subfusoid to fusoid, ends slightly pointed, sometimes curved, in outline equilateral, broader above, narrower below, with small guttules present in each cell of the spore. Paraphyses exceeding the asci, filiform, unbranched, 1.0 μm near the base, expanding up to 2.0 μm at the apex, there becoming embedded in a gelatinous matrix to form an epithecium, walls thin, smooth, hyaline. Subhymenium poorly developed, hyaline, in the center to ca. 20-30 μm, and as narrow as 5-10 μm toward the margin, consisting

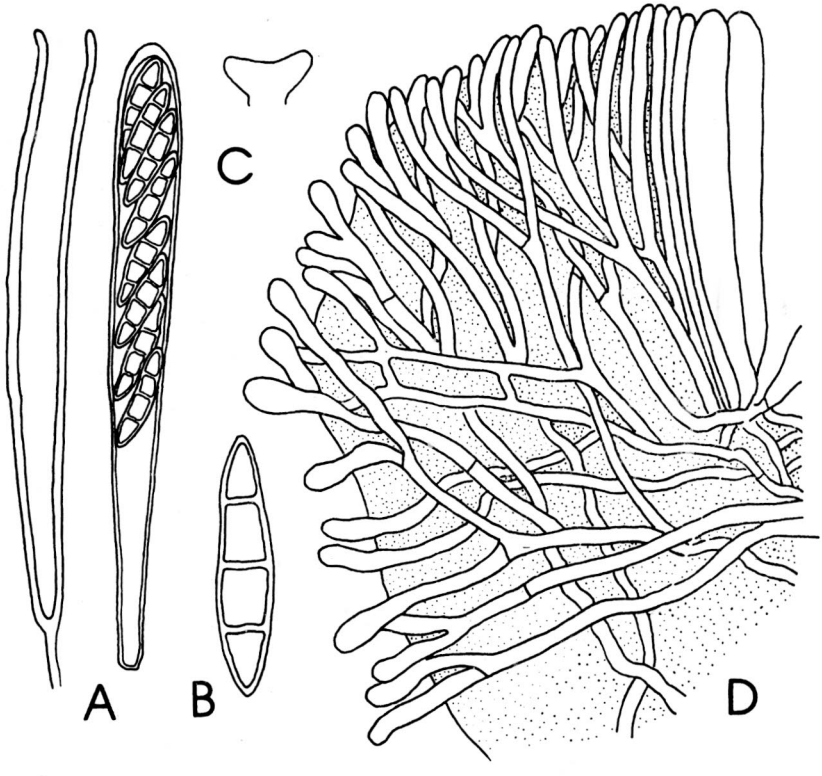

FIGURE 1. *Bisporella triseptata,* Dennis 1198, camera lucida drawings. A. Branching paraphysis (left) and ascus containing 8 triseptate ascospores (right), x 1.000. B. Triseptate ascospore, x 2.000. C. Median longitudinal section of whole apothecium, ca. x 20. D. Median longitudinal section at margin of apothecium, x 1.000.

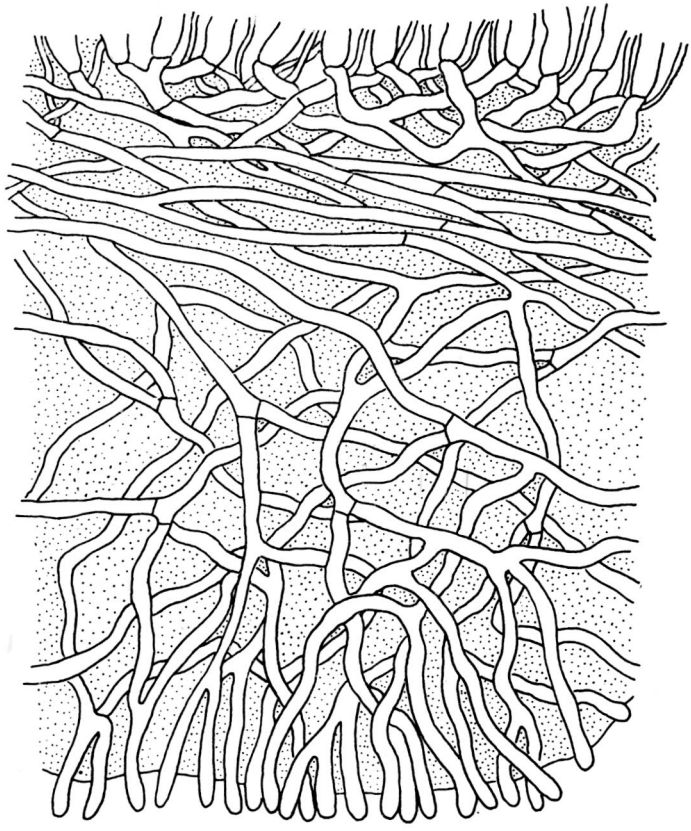

FIGURE 2. *Bisporella triseptata,* Dennis 1198, camera lucida drawing of median longitudinal section of apothecium at a point midway between margin and point of attachment of apothecium with substrate, x 1.000.

of loosely arranged croziers and hyphae, the individual cells hard to discern. Medullary excipulum not differentiated. Ectal excipulum consisting of a single layer, well differentiated from the subhymenium, entire layer hyaline, to 50 μm wide toward the margin and 100 μm wide toward the base, refractive and gelatinized, the majority of hyphae turning outward towards the receptacle at an angle perpendicular to the direction of growth of the apothecium, with other hyphae crossing these at an angle almost parallel to the growth of the apothecium. The tips of the excipular hyphae run out beyond the gel layer into slightly inflated hairs, 10-12 x 2.5-3.0 μm hyaline, thin-walled, smooth. Margin well developed, equalling the tips of the paraphyses, constructed as the ectal excipulum.

ETYMOLOGY OF THE SPECIFIC EPITHET: Refers to the three-septate spores.

HABITAT: On woody parts of various Monocotyledons.

NOTES. In general, there is some variability in the dimensions of asci and ascospores of collections of *B. triseptata.* Collections from Peru exhibited the greatest spore length and ascus length. These collections differ from the collections with shorter spores and asci in that they were found growing on culms of herbaceous grasses; collections with smaller ascus and ascospore dimensions are found on woody parts of *Puya* and *Chusquea.* In that all other characters agree with the microanatomy and general aspect of the type material, we consider this variation to fall within the normal variation for a single species due, in part, to their slightly different substrate and more southerly distribution.

Dennis (1960) noted that the type collection occurred on stromatic Pyrenomycetes. Our examination of the type material indicates that the fungi underlying the apothecia are indeed Pyrenomycetes, but are represented by the asexual phase of the Pyrenomycetes; the perfect or sexual stages are absent from the type collection. These asexual states belong in the genera *Pteroconium* and *Arthrinium,* whose reported sexual states belong in the genus *Apiospora* Sacc. No doubt, the substrate is favorable to more than one group of fungi, their association being a matter of substrate preference rather than a fungus-fungus interaction; in some collections, no Pyrenomycetes were found at all on the substrate.

SPECIMENS EXAMINED: Colombia: Boyacá, along the Sogamoso-Aguazul road, at a point ca. 38 km from the intersection with the Sogamoso-Aquitania road, elev. ca. 9.000 ft., *Chusquea* culm, 13 Jun 1976, *K. P. Dumont, S. E. Carpenter, M. A. Sherwood & L. A. Molina, CO-5093;* Cundinamarca, ca. 15 km from Bogotá, on the Bogotá-Choachí road, elev. ca. 10.000 ft., *Puya*

leaves, 4 Aug 1976, *K. P. Dumont, S. E. Carpenter & M. A. Sherwood, CO-5529;* Norte de Santander, ca. 104 km from Bucaramanga, on the Bucaramanga-Pamplona road, elev. ca. 10.000 ft., *Chusquea* culm, 21 Aug 1976, *K. P. Dumont, M. A. Sherwood & L. F. Velásquez, CO-7060.* Perú: Huanuco, vicinity km post 450 from Lima, on the Huanuco-Tingo María road, elev. 8.500 ft., indet. herbaceous stem of Poaceae, 2 Jul 1976, *K. P. Dumont, S. E. Carpenter, M. A. Sherwood & P. Buriticá, PE-498;* Huanuco, ca. 38 km from Tingo María, on the Tingo María-Pucallpa road, elev. ca. 5.200 ft., herbaceous stem, 4 Jul 1976, *Dumont et al., PE-736, 738;* Venezuela, Holotype, Dto. Federal, El Avila, ca. 1.900 m, in Bamboo Cloud forest, 4 Jul 1958, *R. W. G. Dennis 1198 = KH 2056/76;* Aragua, ca. 7 km from Colonia Tovar, on Colonia Tovar-La Victoria road, bamboo stem, 14 Jul 1971, *K. P. Dumont, J. H. Haines & G. J. Samuels, VE-2198.*

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